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ABSTRACT

A study investigated the use of horizontal instruction to teach Spanish-speaking secondary students an inferential English reading skill. It looked at (1) the relationship between the students' class-inclusion skills and their ability to identify the implied main idea, (2) the effect of sequentially-developed classification lessons on the students' ability to identify the implied main idea, and (3) the effect of the language of instruction (monolingual or bilingual) on the students' ability to learn a comprehension skill. The results suggest that the students used schemata, including classification in part-whole relationships, during the process of learning English reading skills, implying that the ability to classify is necessary to many learning activities. However, this study does not clarify how such skills should be taught. (MSE)

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A COGNITIVE APPROACH TO TEACHING READING
TO SPANISH-SPEAKING ADOLESCENTS
BY

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A paper to be presented at the Annual Meeting
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INTRODUCTION

Although a considerable amount of research has been conducted in the area of cognition and reading among elementary school-level, monolingual children, almost no research has been conducted in this area with bilingual adolescents. Very little is known about either the thinking processes or effective instructional methods for teaching reading skills to this population.

In his review of research on cognitive development and bilingualism, Cummins (1977) concluded that bilingualism did not necessarily hinder nor interfere with the cognitive skills of bilingual children. In a study conducted with five-year old bilingual children, Valencia (1976) concluded that tasks such as classification, seriation, and conservation are transferable from English to Spanish and from Spanish to English. Worrall's (1970) study of young Afrikaans-English bilinguals suggests that the bilingual children excelled in tasks that required them to use the concept that names are arbitrarily assigned to objects. It seems reasonable to assume that, as there is some support for the theory that bilingualism does not interfere with the cognitive development of elementary school children, bilingualism should not be detrimental to the cognitive development of secondary students.

By the time students enter high school, whatever their linguistic or cultural background, they are faced with many cognitive tasks that vary from subject to subject. Most of these tasks involve reading and writing skills, which are critical for success in school. Reading is a symbolic and abstract

experience. The symbols represent concrete or abstract ideas, which the reader must process within his own experiential framework. Barrett (1968) and Gerhard (1975) write that classification is one cognitive skill necessary in developing higher level reading skills. These authors contend that in order for students to read at the inferential level, they must be able to classify at the abstract or symbolic level. Other researchers have found relationships between the ability to categorize and semantic development, Gelman (1978), Petrey (1977); and Smith, Shoben, and Rips, (1974).

Lowery (1977, 1981a) contends that models of most American schools perpetuate the notion of a constant acceleration of stages in an ever-ascending vertical sequence. The author argues that in the current system, many students progressively lose control over their own rate of development and sense of success. Lowery contends that the current accelerated vertical curriculum contributes to developmental disfunction.

Through research conducted in over 300 classrooms, Lowery has developed an alternative model to the vertical curriculum. Lowery calls this model horizontal curriculum. In operation, this idea allows students at an identified level of development to explore many experiences, e.g., class-inclusion, within and near that level. Students, the author contends, learn something most readily when they are provided with concrete, pictorial and, finally, abstract or symbolic experiences during the learning process and has named this model "horizontal instruction."

In an attempt to validate the model in teaching reading

skills, research has been conducted with English-speaking elementary and secondary school students teaching them the strategies necessary to identify the implied main idea of paragraphs that required class-inclusion decisions. (Hadsell 1978; Stein 1979; Camozzi 1980, and Berget and Valverde 1983). These studies have shown that experiences based on the concept of horizontal instruction have helped English-speaking students improve their reading comprehension skills.

Other research on the relationship between reading achievement and classification among elementary school students appears to indicate a relationship between comprehension and the ability to classify (Smith-Burke 1976, and Williams 1984). In addition, a recent study conducted by Perkins and Angelis (1985) found that adult English as a Second Language students who could find the common features (category) of a set of stimuli were more proficient in reading comprehension skills than similar students who could not demonstrate this skill. Moreover, other researchers have found a link between certain Piagetian cognitive tasks and reading among elementary school children. Stack (1976), Raven and Salzer (1971), Almy (1967), and Macomber (1972) related several of Piaget's stages of the learning process to the developmental aspects involved in reading comprehension.

One of the basic principles of bilingual education is that limited English proficient students will learn better if concepts are taught in their native language. It seems reasonable to assume that students will learn more when explanations and exercises are presented in a language they understand than if they are presented in a language they do not understand.

Research by Kaufman (1968) and Escamilla (1985) indicates that there is a positive relationship between Spanish and English reading.

Purpose of the Study

Research suggests a relationship between Piagetian cognitive skills and first language reading. It seems reasonable to assume that a such a relationship would also exist for students for whom English was not their primary language. Previous studies have demonstrated that the use of horizontal instruction has been successful teaching English-speaking secondary students an inferential reading skill. It was the opinion of the investigator that it also might prove to be successful with Spanish-speaking secondary students. Research suggests that students learn more concepts when they are taught in a language they understand. The purpose of this study, therefore, was to investigate three major questions: 1) what is the relationship between the students' class-inclusion skills and their ability to identify the implied main idea; 2) what is the effect of sequentially developed classification lessons on the students' ability to identify the implied main idea; and 3) does language of instruction, i.e., monolingual or bilingual, make a difference in the students' ability to learn a comprehension skill?

METHOD

Population

The population with which this study was concerned was limited English-speaking, Spanish-language dominant high school students who were enrolled in a bilingual program. A bilingual

program was defined for the purposes of this study as one which provides "instruction in two languages and the use of two languages as mediums for instruction for any part or all of the school curriculum." (Andersson, 1978, p. 32). All the participants in the study attended one high school. The school was located in an urban, multicultural school district.

The sixty-three participants in the study came from four bilingual reading classes of approximately 15 students per class. To participate in the study, the students: 1) were native speakers of Spanish; and 2) had a limited knowledge of written English as measured by a standardized reading test (a score of below 7.0 on The Nelson Reading Test, Level 3, Form C).

The range in age for the population was 15 - 20 years. The mean age was 16.9 years. It should be noted that 22 of the students participating in the study were older than 17. The majority of the students were born in Spanish-speaking countries and most of them came from Mexico. A majority of the students reported speaking only Spanish at home. More males than females took part in the study, and almost half the students were freshmen. The students participating in the study had been in the United States for an average of six years.

Because of the school setting, it was impossible to randomly assign students or classes. The teacher strongly urged that the classes with the most limited English proficient students receive the bilingual treatments. It was therefore, within these constraints that the four groups were assigned to a particular treatment group. The classes remained intact due to limitations

imposed by the school administration.

Procedures

Four groups of students participated in the study. Two of the groups received classification lessons. One of these groups was taught bilingually. The other two groups of students received standard lessons. One of the latter groups also was taught bilingually. The experimenter taught all four groups participating in the study.

The treatment took two weeks to complete. The treatment period lasted ten days and each group, therefore, received ten 50-minute periods of instruction. A pretest was administered before the treatment and control lessons. After the completion of the treatment, each group responded to a similarly constructed posttest. The study took place in January, 1985.

The dependent variables were the posttest scores on tests of picture, word, and sentence classification, and scores on main idea tasks. Six paragraphs made up this part of the posttest. Three paragraphs had a concrete topic and three had an abstract topic. The other written tasks also had concrete and abstract topics.

The Classification Lessons

The subject matter of the words and paragraphs dealt both with abstract and concrete topics. In a Piagetian model, students progress from dealing with concrete experiences to abstract experiences. These lessons, by providing both abstract and concrete subject matter, gave the students the opportunity to deal with both types of topics. All the tasks began with clusters of exercises which began with an explicit main idea and

ended with an implicit main idea.

The development of the lessons followed the horizontal instructional model of providing the students with concrete, pictorial and abstract classification experiences. The application of this model to the construction of lessons in how to infer the main idea was based on previous research, Stein (1979), Hadsell (1978) and McInnes (1980). The method used in all the classification lessons was to demonstrate first to the students concepts of part-whole (general-specific) relationships and then have the students learn them. These concepts were taught by providing the students with a variety of classification tasks. The concrete, pictorial, and abstract classification tasks enabled the students to explore the common attributes of groups of objects and pictures, as well as words and sentences. The students had the opportunity to manipulate objects. They were also provided with examples of different types of part-whole relationships and could ask questions about the concepts they were learning.

Concrete topics included anything that could be touched, heard or seen. Some of these topics were food, methods of transportation, and animals. Abstract topics included anything that could not be touched, heard or seen. Some of these topics were emotions, historical events, and illness.

The Comparison Lessons

The comparison lessons were developed from textbooks and workbooks which dealt with inference and how to identify stated and implied main ideas. These were the materials that the

regular classroom teacher uses when teaching these reading skills. The students were instructed to look for "clue" words to help them indentify the main idea. These words were who, what, when, and where. They were also instructed to look for clues in paragraphs to help them make inferences or judgements based on facts. These lessons consisted of material that also had both abstract and concrete topics.

The Measures

All the students participating in the study were administered a pre- and a posttest that were written by the investigator. These tests consisted of four parts: picture, word, and sentence classification as well as main idea tasks. These tests were checked for reliability and validity by means of a pilot study of the test instruments. The administration of each test took approximately fifty minutes.

RESULTS

The results discussed in this section deal with the three major questions investigated by the study which concered: 1) the relationship between non-verbal and verbal classification tasks and reading, 2) a comparison of the horizontal instructional model with a traditional method for teaching Spanish-speaking students how to infer the main idea; and 3) the comparison of bilingual instruction and monolingual instruction to teach bilingual adolescents how to infer the main idea.

The results will begin with a discussion of the first research question concerning the relationship between class-inclusion skills and test scores on inference, as well as word and sentence classification.

Table 1 displays the relationship between the picture classification scores and reading task scores.

Table 1

Relationship between picture classification scores and scores on concrete and abstract topic tasks: pretest, n= 63		
	CONCRETE	ABSTRACT
Pictures and Words		
Kendall's γ =	.207 p = .102	.228 p = .055
Pictures and Sentences		
Phi =	.159 p = .435	.103 p = .481
Pictures and Paragraphs		
Kendall's γ =	.256 p = .033*	.451 p = .002**

*p<.05 **p<.01

The relationship between the picture classification scores and the concrete paragraph scores was significant, $p<.05$. Similarly, the relationship between the picture classification scores and the abstract paragraph scores was significant, $p<.01$. The relationship between the scores on abstract word classification and picture classification scores was nearly significant, $p<.055$.

The interrelationships between all the abstract and concrete writing tasks were also examined. (This analysis was conducted only for the pretest scores, because the treatment might affect the posttest scores.)

Analyses of the pretest scores suggest several types of relationships between the abstract and concrete word and sentence classification tasks. There also appear to be significant relationships between these classification tasks and tasks involving identification of the implied main idea.

Table 2

Relationship between abstract and concrete
classification tasks: pretest, n = 63

		ABSTRACT			CONCRETE		
		WORD	SENTENCE	PARAGRAPH	WORD	SENTENCE	PARAGRAPH
A							
B	WORD		r=.240 p=.016*	r=.406 p=.000***	r=.353 p=.000***	r=.303 p=.003**	r=.230 p=.017*
S							
T							
R	SENT			r=.199 p=.070	r=.136 p=.119	ϕ =.187 p=.073	r=.167 p=.123
A							
C							
T	PARA				r=.307 p=.002**	r=.250 p=.024*	r=.352 p=.002**
C							
O	WORD					r=.268 p=.010*	r=-.016 p=.869
N							
C							
R	SENT						r=.058 p=.593
E							
T							
E	PARA						

*p<.05 **p<.01 ***p<.001

Note. The following procedures were used in the
construction of this Table:

Pearson r - paragraphs with paragraphs

Phi - sentences with sentences

Kendall's γ - the remaining analyses

All the classification tasks and the paragraph tasks appear to be strongly related. The only exception to this pattern is the relationship between the concrete word and sentence classification tasks with the concrete paragraph tasks. These tasks do not appear to be significantly related, contrary to what was expected.

The next set of analyses deals with the second and third research questions, which concern the effect of classification and language of instruction on the students' ability to infer the main idea.

Tables 3 and 4 display the means, standard deviations, and pre-to-posttest differences for the scores for the concrete paragraph tasks.

Table 3

Means, standard deviations, and pre-to-posttest differences:
tests of implied paragraph main idea, concrete topics

N=63 Groups	concrete				difference	
	pretest $\bar{X}$	S	posttest $\bar{X}$	S	$\bar{X}$	S
1 n=19	5.78	4.19	7.84	3.62	2.05	4.91
2 n=14	6.85	4.38	7.78	3.78	.93	4.98
3 n=16	7.25	3.04	7.87	2.68	.62	3.38
4 n=14	6.07	3.29	8.64	2.98	2.57	3.15
Groups: 1 = Control Bilingual			3 = Experimental English			
2 = Control English			4 = Experimental Bilingual			

Note. Maximum Score = 12. Minimum Score = 0.

Table 4

Means, standard deviations, and pre-to-posttest differences:
tests of implied paragraph main idea, abstract topics

N=63 Groups	abstract				difference	
	pretest $\bar{X}$	S	posttest $\bar{X}$	S	$\bar{X}$	S
1 n=19	4.42	3.62	6.68	3.26	2.26	4.58
2 n=14	6.00	4.55	6.71	3.33	.71	4.89
3 n=16	5.93	2.64	8.25	2.95	2.32	3.03
4 n=14	2.78	3.30	7.07	4.19	4.29	3.69
Groups: 1 = Control Bilingual			3 = Experimental English			
2 = Control English			4 = Experimental Bilingual			

Note. Maximum Score = 12. Minimum Score = 0.

Tables 3 and 4 show that all four groups of students improved from pretest to posttest on both abstract and concrete topic paragraphs. The Experimental Bilingual and the

Experimental English groups had the highest means on the paragraph posttest for both the abstract and concrete topics. The Experimental English group had the highest mean on the pretest for the concrete topic paragraphs. Although this group showed an improvement on the posttest mean, it was not as much as the Experimental Bilingual group.

Tables 3 and 4 also display the pretest to posttest differences for the four groups. The differences were computed by subtracting the pretest paragraph scores from the posttest paragraph scores for each student. All four groups showed an improvement from pretest to posttest. The Experimental Bilingual group had the largest pre-to-posttest difference among the four groups for both the abstract and concrete topic paragraphs. The experimental English group had a slightly larger difference on the abstract paragraphs than the Control Bilingual group, and a substantially larger difference than the Control English group.

An analysis of variance examined the pre-to-post differences to test for any difference between the groups. The analysis results indicate that there were no differences between the groups. On the concrete paragraphs gains, neither main effect for the classification treatment nor language of instruction, nor their interaction were found to be significant. For abstract paragraph gains, however, an effect was more evident for language, $F(1,59) = 2.80$, $p < .099$, and treatment, $F(1,59) = 3.01$, $p < .088$. Therefore, the results did not support the expectation that the group of students that was taught bilingually and received instruction that implemented classification lessons

would exhibit significantly higher gains on the posttest than students who received monolingual traditional instruction.

Tables 5 and 6 display the means, standard deviations, and pre-to-posttest differences for the word classification tasks.

Table 5
Means, standard deviations, and pre-to-posttest differences:
word classification tasks, concrete topics

N=63 Groups	Concrete					
	pretest $\bar{X}$	SD	posttest $\bar{X}$	SD	difference $\bar{X}$	SD
1 n=19	6.58	2.24	7.11	1.66	.53	2.56
2 n=14	7.36	1.28	7.21	1.05	-.15	1.35
3 n=16	7.44	1.15	8.25	2.80	.81	1.17
4 n=14	6.50	1.91	7.36	2.13	.86	1.51

Groups: 1 = Control Bilingual

3 = Experimental English

2 = Control English

4 = Experimental Bilingual

Note. Maximum Score = 9 Minimum Score = 0.

Table 6

Means, standard deviations, and pre-to-posttest differences:
word classification tasks, abstract topics

N=63 Groups	Abstract					
	pretest $\bar{X}$	SD	posttest $\bar{X}$	SD	difference $\bar{X}$	SD
1 n=19	5.37	2.89	6.90	1.24	1.53	2.65
2 n=14	7.21	1.62	6.50	1.99	-.71	2.52
3 n=16	7.38	1.62	8.25	1.30	.87	1.87
4 n=14	5.71	2.05	7.57	1.09	1.86	2.24

Groups: 1 = Control Bilingual

3 = Experimental English

2 = Control English

4 = Experimental Bilingual

Note. Maximum Score = 9 Minimum Score = 0.

Table 5 indicates that on the posttest for the classification of concrete topic words, the Experimental English

and the Experimental Bilingual group had higher means than the two control groups. On the classification of abstract words posttest, the Experimental Bilingual and the Experimental English groups had higher mean scores than the control groups. The mean for the control English group declined on the posttest.

An analysis of variance examined the pre-to-posttest differences on the word classification tests in order to test for any differences between the groups. The analysis of variance indicated that for gains on the concrete word classification tasks, neither main effect for treatment nor language, nor their interaction were found to be significant. For abstract word classification tasks, the analysis of variance showed a significant treatment effect for language, $F(1,59) = 7.75$, $p < .01$, but it did not indicate significance for treatment or the interaction effect of language and treatment. An inspection of the gain scores corroborates that the bilingual treatment groups had the largest differences from pre-to-posttest.

CONCLUSIONS AND IMPLICATIONS

The first question investigated by the study was the relationship between the students' performance on picture classification tasks and their performance on comprehension tasks requiring inferring the main idea. The data indicate strong support for the hypothesis that there is a relationship between the students' performance on picture classification tasks and implied main idea tasks. There were statistically significant relationships among the variables.

In addition, the study also found several significant relationships between the various verbal abstract and concrete

classification tasks. These classification tasks were, for the most part, significantly related to the inferential main idea tasks. The data appear to support the hypothesis that performance on word and sentence classification tasks is significantly related to performance on the inferential main idea tasks.

The next question investigated by the study was the effect of using sequentially developed classification lessons to teach the implied main idea, as well as word and sentence classification. The data indicate no statistical support for the hypothesis that classification lessons make a difference in teaching Spanish-language dominant students how to infer the main idea of paragraphs requiring part-whole decisions. However, the pre-to-posttest differences favor a treatment effect, although not statistically significant, for the abstract rather than the concrete tasks. The direction of the pre-to-posttest differences favors the groups that received the classification treatments.

Although the reasons for the results are unclear, there are some possible explanations. It might be that classification skills are more important in teaching students how to identify the implied main idea of abstract topic paragraphs than those with implied concrete topics. It is possible that the cognitive strategies involved in identifying the abstract main idea require

¹ Data were collected and analyzed for the pre-to-posttest differences for the picture and sentence tasks, but were not of sufficient interest to be included in this paper.

a more complex schemata or processing model, and that these strategies were more sensitive to the treatment.

The study did not support earlier findings by Valverde and Berget (1983), Hadsell (1979), Stein (1979), and McInnes (1980), that classification lessons made a difference in teaching students how to infer the main idea. One difference between the present study and some of the previous ones was the length of treatment, the number of students and randomization of the sample.

The treatment effects for the abstract tasks followed a consistent pattern throughout the study, with the exception of the sentence data (see Footnote 1). The overall treatment effect for the abstract tasks was consistently more evident than the effect for the concrete tasks. This was not anticipated. It is not clear why this occurred, but these are some possibilities. One explanation is that the concrete tasks were simply too easy for the population. This is supported by the fact that a scatterplot indicated a ceiling effect for the concrete paragraph tasks. It might also be that the cognitive strategies that students use to identify concrete topics are different from those they use to identify abstract topics. Therefore, it may be that the treatment was most effective in helping students develop the strategies necessary to identify abstract rather than concrete topics throughout the study.

Another question with which the study was concerned was the effect of bilingual instruction on inference of the main idea, and the classification of words, sentences and pictures. The

study found that bilingual instruction made a statistically significant difference between the groups in their ability to classify abstract words. The two groups that received the bilingual treatments had the larger pre-to-posttest differences. There were no significant language of instruction differences between the groups in their ability to infer the main idea or to classify sentences or pictures. The pre-to-posttest differences favor a language of instruction effect for the abstract paragraph tasks, although the differences were not statistically significant. The data support the hypothesis that bilingual instruction makes a difference in teaching abstract word classification. Support for the hypothesis that bilingual instruction makes a difference is not as strong in teaching students how to identify the main idea of paragraphs requiring part-whole decisions.

One explanation for this finding may be in the length of the bilingual treatment. The bilingual treatments were only conducted for the first four portions of the treatment period, which consisted of ten instructional segments. In order to more adequately test the hypothesis that bilingual instruction makes a difference, this treatment should be extended for the entire treatment period. As previously noted, the treatment may have been more effective for the abstract tasks, because the strategies involved in dealing with concrete topics may be different from those used when dealing with abstract topics.

The overall results of the study appear to indicate a strong relationship between performance on picture classification tasks and performance on tasks requiring identification of the implied

main idea. The results of the study also appear to support Lowry's hypothesis that there is a relationship between students' attainment of classification skills and students' performance on tasks involving concepts in reading. However, the study did not support earlier research that classification lessons made a difference in teaching students how to infer the main idea. An examination of the data indicates that the classification treatment groups did perform better than the control groups on most of the criterion tests, although the differences were not statistically significant. The data support the hypothesis that bilingual instruction makes a difference in teaching students abstract word classification. There also was a suggestion of a language effect in the abstract paragraph tasks.

Limitations

There are several limitations to the study. The most important of these was the lack of randomization of the students in the investigation of the treatment effects, although this limitation was not a factor in the investigation of the relationship between the students' performance on non-verbal classification tasks and reading tasks. Other limitations include: the quality of some of the measures, the small number of students per treatment group (fifteen), and a measure of the students' reading ability in Spanish.

The results of the investigation must be cautiously interpreted. Since one cannot justifiably generalize from this study to teaching practices, or from the target population to any other, the implications must be tentative. Consequently, the

principal implications of the research findings concern directions for further research.

Implications for Future Research

As stated previously, very little research has been conducted in teaching reading to Spanish-speaking high school students. In order to verify the results of this study, a similar study should be carried out with a larger, randomly selected population.

In all four groups of students, a substantial number of students were not able to classify pictures in part-whole relationships. This was not expected. Although the directions were given in English to each group, they were also given individually in Spanish as needed. However, it is possible that the students could not understand the English instructions. A change in a future study would be to give a similar population written, as well as oral, directions in Spanish and English rather than only in English.

Another change would be a more open-ended analysis of the categories engendered by the students' picture classification tasks. In the present study, the picture categories were established before administration of the tasks. In a future study, the students could be allowed to classify pictures in categories other than those previously established. The students, however, would need to give a rationale for their categories. Further research should be conducted to ascertain the ways in which Hispanic secondary students classify.

In addition, Piagetian tasks are usually administered on an individual basis. In the strictest interpretation of Piagetian

practice, tests should not be group administered. Piaget's method involved a one-to-one technique. The non-verbal task should be administered individually to more accurately test the students' ability to classify pictures.

This study found a significant relationship between main idea and classification. Poor performance on picture classification was related to poor performance on tasks requiring identification of the implied main idea. This result merits further study. The relationship between reading skill development and classification should be studied in more detail. This study focused on paragraphs that required part-whole decisions in order to identify the main idea. Future research might investigate other types of classification skills, e.g., hierarchical, and other types of paragraphs.

Any cultural influences on the students' ability to classify and to generate category labels were not discussed in the study. It might be that cultural influences affected the students' cognitive strategies in how to classify. There are many ways to classify and to interpret categories. Cultural factors might have influenced the students' concepts of what constitutes a class.

Conclusion

Very little research, if any, has investigated the role of cognitive strategies in English reading skill development for Spanish-speaking adolescents. The approach used in the work reported here was bilingual as well as innovative. The results of the study, which must be interpreted cautiously, suggest that

Spanish-speaking adolescents used schemata during the process of learning English reading skills. The ability to classify in part-whole relationships appears to be one part of the schemata used by these students during this skill development.

It is the opinion of the investigator, and shared by many other researchers, that students need to be able to classify. It is a skill that is necessary in many learning activities. It is one way through which we mentally structure the sensory input from our environment. Consequently, teachers may want to consider some strategies which would assist students in the development of these skills. This may be one way of encouraging a basic cognitive ability, i.e., how to classify. However, the exact manner of implementing such instruction is not clear from the present study. The present research explores one approach to implementing such instruction; there may be others.

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